

***DRAFT – 10-25-04***

**DOCTORAL EDUCATION IN TEXAS, PART 2:  
RECOMMENDATIONS FOR THE STATE**

October 2004  
Texas Higher Education Coordinating Board

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**Summary of Revisions to the October 20, 2004 Draft of  
Doctoral Education in Texas, Part 2:  
Recommendations for the State**

In response to comments and suggestions made by many institutions and Coordinating Board members to the October 20, 2004 draft of the doctoral report, the staff have made the following modifications to that draft:

1. The quality measure “percent of graduates employed in the field within one year of graduation,” has been clarified to include graduates taking post-doctoral positions (page 3 in the new draft).
2. New language makes it explicit that an institution can ask for planning authority (upon approval by the Commissioner) for a doctoral program at times other than during an institution’s four-year review cycle. Rationale for more flexibility in this regard has also been included (page 6).
3. Clarifying language has been added to indicate that expanding existing doctoral programs is not always the best solution to provide for doctoral growth in a given discipline (pages 7 and 9).
4. An additional criterion for planning authority for doctoral program now includes whether there is an unmet need for a doctoral program with a unique approach to a particular field (page 7).
5. Clarification has been made that staff is *not* recommending that smaller institutions or institutions from less populated areas be prohibited from having doctoral programs (page 11).
6. The graph on time-to-degree for health-related institutions has changed for Baylor College of Medicine due to corrected information provided by the institution (page 23).
7. A final recommendation has been added that the Commissioner appoint a standing committee on graduate education that has broad institutional representation to advise the staff on implementing the recommendations in the report and to provide future suggestions for doctoral education in the state (page 30).

The new draft, dated October 25, 2004, reflects the above changes. New language is shaded and deleted language has strikethroughs.

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## Executive Summary

This document, the second of a two part report, raises several “key questions” about doctoral education in Texas and provides 16 recommendations addressing these questions. The recommendations, listed below, are grouped by six doctoral education issues: quality, statewide planning, access and opportunity, diversity, attrition and time-to-degree, and research funding.

### Recommendations–Quality:

1. Texas public institutions that grant doctoral degrees should make public to potential and current students the following information about their recent doctoral graduates *by program*:
  - a. degrees awarded per year
  - b. graduation/attrition rates
  - c. average time-to-degree
  - d. percent of graduates employed in the field (or in a “post-doctoral position”) within one year of graduation (separated by academia and other fields)
  - e. average amount of financial support (fellowships and teaching and research assistantships) given to full-time students
2. The Coordinating Board should make public the doctoral graduation rates and time-to-degree averages for all Texas public doctoral-granting institutions.
3. The Coordinating Board should conduct (on a periodic basis) statewide surveys and evaluations of doctoral programs in selected disciplines of importance to the state. Institutions would be asked to provide information on the following measures (in addition to what the Coordinating Board already collects):
  - a. number and percent of doctoral graduates employed in the field (or in a post-doctoral position) within one year of graduation and the average length of time to secure the job
  - b. number of core faculty by rank in the doctoral program
  - c. teaching loads of core doctoral faculty
  - d. number of peer-reviewed publications/full-time faculty equivalent (FTFE) of core doctoral faculty/year
  - e. number of dollars in grants/FTFE of doctoral core faculty
  - f. percent of doctoral students in the program who are full-time
  - g. percent of full-time doctoral students with fellowships or research or teaching assistantships
  - h. dollar amount of research and teaching assistantship stipends for doctoral students
  - i. full-time student equivalent (FTSE)/FTFE in the doctoral program

Institutions with low performance would be directed to submit a rationale for program continuance and plans for improvement. Programs would be monitored and, if improvements were not forthcoming, programs could be closed.

**Recommendations—Statewide Planning:**

1. Require institutions to have planning authority for a doctoral program before submitting it to the Coordinating Board. Planning authority requests to the Board for doctoral programs should usually come during an institution's regular four-year review cycle. However, upon approval by the Commissioner, the Board may allow institutions to request planning authority at other times if the need for more prompt action is warranted. Institutions should provide a strong rationale for such a request.
2. In addition to the four criteria now applied in considering planning authority for degree programs at *any* academic level, change Coordinating Board rules to include added criteria applied to doctoral program requests. The criteria specific to doctoral requests would be whether:
  - a. there is a demonstrated state and national unmet need (now and in the foreseeable future) for *doctoral* graduates in the field (not just baccalaureate or master's-level graduates); or there is an unmet need for a doctoral program with a unique approach to the field;
  - b. there is evidence that existing doctoral programs in the state cannot accommodate additional students; or that expanding existing programs would not best serve the state;
  - c. the institution has strong baccalaureate- and master's-level programs in the field and/or strong programs in related and supporting areas;
  - d. the program has the marked promise of excellence and the institution is well-suited (sometimes uniquely suited) to offer the program and achieve that targeted excellence; and
  - e. the institution's existing programs (undergraduate and graduate) have demonstrated excellence.
3. Change the name "planning authority" to another term that better denotes the meaning of the designation. The staff recommend the term "preliminary authority."
4. Perform and implement a statewide needs assessment to identify key disciplines in which the state and nation need additional growth in doctoral graduates and disciplines that have low or no call for growth. The assessment would also include an institutional analysis to identify universities or health-related institutions that would be well-suited to offer high need programs.

**Recommendations—Access and Opportunity:**

1. Where appropriate, support access to doctoral study through distance education efforts and cooperative programs in selected disciplines to address unmet regional needs.
2. Support additional targeted doctoral programs in areas of the state with high populations, a large number of baccalaureate graduates, and demonstrated, unmet regional needs. This recommendation presumes that the proposed "preliminary authority" criteria would be met.

3. Support doctoral program requests that emerge from the needs assessment process outlined earlier in this report. In particular, support requests from well-suited institutions in regions with fewer doctoral programs, especially if the regions are highly populated.
4. Encourage and expect existing prominent doctoral programs in the state to aggressively recruit students from the state's regional institutions, particularly those in areas with few doctoral programs.

**Recommendations–Diversity:**

1. Encourage institutions to implement practices to increase diversity in their doctoral programs such as to:
  - Develop mentorship programs, especially between faculty members and undergraduate students
  - Recruit students from historically Black- and Hispanic-serving institutions that send a high number of their baccalaureate graduates to graduate school.
  - Increase awareness of the various national programs that are available to support Black and Hispanic graduate students financially and academically.
  - In creating budgets, allocate resources specifically for the development of programs and initiatives to increase diversity in graduate education.
2. The Coordinating Board should direct institutions with “low percentages of Black and Hispanic students” in their doctoral programs to formulate a plan to increase participation by these groups and to monitor progress.
3. Continue to support the U.S. Department of Education's Office for Civil Right's *Priority Plan to Strengthen Education at Prairie View A&M University and Texas Southern University* to enhance doctoral education at these institutions
4. Examine ways to stabilize the presence of international students in doctoral programs.

**Recommendation–Attrition and Time-to-Degree:**

1. Encourage institutions to implement strategies to increase student persistence and reduce time-to-degree, such as:
  - Providing competitive student financial support for doctoral students in the form of fellowships, research assistantships, and teaching assistantships.
  - Providing adequate advising and mentoring for doctoral students.
  - Provide explicit expectations for doctoral students at the departmental level.

- Implementing specific activities at the institutional, departmental, and individual levels that are designed to increase completion rates, including orientation programs, peer-support groups, dissertation writing workshops, and academic publishing workshops.
- Balancing the deep learning of the disciplinary doctorate with the variety of interdisciplinary challenges.

**Recommendation—Research Funding:**

1. While recognizing that some important and worthy disciplines are afforded minimal opportunities for federal funding, to address the research goal of *Closing the Gaps*, the state should especially support doctoral programs that have potential for garnering significant federal research monies or otherwise bring benefits to the state.

**Other Recommendation:**

1. Establish an on-going advisory committee on graduate education, with broad institutional representation to: a) help implement the recommendations above, b) help evaluate the success of implementation, and c) suggest additional ways to enhance graduate and, especially doctoral, education.



***DRAFT – 10-25-04***  
**Doctoral Education in Texas, Part 2:**  
**Recommendations For The State**

**Introduction**

Doctoral education is a critical component of higher education in Texas, and the Coordinating Board has a commitment to its success. However, doctoral programs are very expensive, and the state has many higher education needs. It is, therefore, imperative to examine the “condition” of doctoral education in Texas and to attempt to enhance its effectiveness in closing the gaps in participation, success, excellence, and research. If Texas is to receive more financial support for higher education, then the Coordinating Board and public higher education institutions must demonstrate excellence and cost effectiveness at all academic levels, including doctoral education.

Part 1 of the report, delivered at the July Coordinating Board meeting, provided statewide and national demographic trends of doctoral education and raised critical issues and concerns about doctoral education relevant to Texas and the U.S. The following document, which is Part 2 of the report, raises 11 “key questions” about quality, statewide planning, access and opportunity, diversity, attrition and time-to-degree, and research funding of doctoral education in Texas. The document also provides 16 recommendations addressing these questions.

## **Section V: Recommendations**

The recommendations below are grouped by six doctoral education issues: quality, statewide planning, access and opportunity, diversity, attrition and time-to-degree, and research funding. Each issue is addressed by posing key questions, presenting background information, providing recommendations to address the questions, and offering specific rationales for each recommendation.

### **A. Quality**

#### **Key Questions:**

1. How can the Board assess the quality of existing doctoral programs at Texas public institutions and what steps should it take to ensure quality?
2. What information should be made public to potential and current students about doctoral programs in Texas?

#### **Background:**

Part 1 of this report (pages 22-24) described the many challenges of evaluating the quality of doctoral programs. Despite these challenges, the report maintained that judging the effectiveness of these programs remains an important responsibility. Students, the Coordinating Board, and the state have legitimate interests in obtaining information about the quality of the state's public doctoral programs. The proposed new accountability system would capture some, but not all, of the information needed for these constituencies.

The Coordinating Board has a thorough process for reviewing and ensuring the quality of proposed *new* doctoral programs. A staff member provides an initial analysis of a doctoral proposal and then hires two consultants – faculty from prominent programs in the discipline from outside Texas – to review the proposal and participate in a site visit at the institution. After the visit, the consultants write an evaluative report indicating whether the institution has the necessary resources in place to offer a high-quality doctoral program. The institution often makes changes to the proposed program as a result of the consultants' report, and sometimes the Coordinating Board mandates that changes be made to the program to gain approval for the program. Once the Board approves a new program, the institution must provide to the staff a report on the progress of the program three years after approval.

However, other than collecting data on enrollment and the number of graduates, the Coordinating Board does not conduct routine reviews of existing doctoral programs to ensure that quality measures are in place. In 1987, the Texas Legislature mandated that the Coordinating Board conduct a statewide sunset review of all doctoral programs at public institutions in the state, and the Board reported the results of that review in 1993. Since that time, however, the Board has not engaged in a comprehensive study of existing doctoral programs in the state. The only systematic review of doctoral programs

the Board undertakes is the review (and possible closure) of low-producing programs every four years.

The following recommendations describe methods for evaluating existing doctoral programs and making important information known to the public. Note that the recommendations draw on some of the quality measures identified for doctoral programs listed in the table on page 23 of Part 1 of this report.

### **Recommendations and Rationales**

1. Texas public institutions that grant doctoral degrees should make public to potential and current students the following information about their recent doctoral graduates *by program*:
  - a. degrees awarded per year
  - b. graduation/attrition rates
  - c. average time-to-degree
  - d. percent of graduates employed in the field (or in a “post-doctoral position”) within one year of graduation (separated by academia and other fields)
  - e. average amount of financial support (fellowships and teaching and research assistantships) given to full-time students

#### **Rationale:**

Students should have full disclosure about the previous success of doctoral students in their field at institutions in Texas to help them assess their own potential for success. Also, making this information readily available will make faculty and administrators more accountable for the success of their programs.

2. The Coordinating Board should make public the doctoral graduation rates and time-to-degree averages for all Texas public doctoral-granting institutions.

#### **Rationale:**

The proposed accountability system already targets graduation rates; time-to-degree is another important measure that can be captured in the Coordinating Board database. The Board can also use these measures as criteria in considering planning authority requests from institutions for future doctoral programs.

3. The Coordinating Board should conduct (on a periodic basis) statewide surveys and evaluations of doctoral programs in selected disciplines of importance to the state. Institutions would be asked to provide information on the following measures (in addition to what the Coordinating Board already collects):
  - a. number and percent of doctoral graduates employed in the field (including post-doctoral positions) within one year of graduation and the average length of time to secure the job
  - b. number of core faculty by rank in the doctoral program
  - c. teaching loads of core doctoral faculty

- d. number of peer-reviewed publications/full-time faculty equivalent (FTFE) of core doctoral faculty/year
- e. number of dollars in grants/FTFE of doctoral core faculty
- f. percent of doctoral students in the program who are full-time
- g. percent of full-time doctoral students with fellowships or research or teaching assistantships
- h. dollar amount of research and teaching assistantship stipends for doctoral students
- i. full-time student equivalent (FTSE)/FTFE in the doctoral program

Institutions with low performance would be directed to submit a rationale for program continuance and plans for improvement. Programs would be monitored and, if improvements were not forthcoming, programs could be closed.

**Rationale:**

The above measures are important indicators of quality in doctoral programs. The Coordinating Board can also use these measures as criteria in considering planning authority requests from institutions for future doctoral programs.

## **B. Statewide Planning**

**Key Questions:**

- 1. Should the Coordinating Board determine if the state has enough doctoral programs in critical disciplines at the appropriate institutions? If so, how should the Board determine this?
- 2. How can the Coordinating Board provide a more proactive role in the guidance/coordination of the development of new doctoral programs and at what institutions?

**Background:**

Graduate programs, including doctoral programs, are critical to higher education in Texas. However, with very tight budget constraints imposed on higher education, the Coordinating Board should weigh the importance of any proposed program against the many other needs of higher education. Not all institutions must have a doctoral presence (or multiple doctoral programs) to claim excellence and prestige for their institutions.

As indicated in Part 1 of this report (pages 24-27), determining which institutions should have doctoral programs and in which disciplines is a challenge for the state. The state's higher education plan, *Closing the Gaps by 2015*, provides general guidance in this area by advocating for mission differentiation among the state's public higher education institutions and by requiring institutions to identify targeted programs of excellence. The plan states that "clearly differentiated missions for Texas higher education institutions will give students, parents, business and industry, communities and other interested

people more precise and understandable information about the focus and programs of each institution. . . Most universities should not strive to be research institutions, but rather focus on strengthening their own unique missions. . . Each Texas public higher education institution must identify its strengths and enhance programs critical to its mission. . .”

In addition to this general guidance provided by *Closing the Gaps*, the Coordinating Board's four-year cycle of Mission Statement and Table of Programs review for institutions is a regulatory process designed to foster mission differentiation and sanction the establishment of specified academic programs at appropriate institutions. The process, which is statutorily mandated, requires each institution every four years to review its Mission Statement for possible revision and to request possible changes to its Table of Programs. The Table of Programs shows in which disciplinary areas (by degree level – bachelor's, master's, and doctorate) the institution has approved academic programs and in which disciplinary areas (by level) the institution has “planning authority.”

Planning authority awarded to an institution for a given discipline (and degree level) is the first part of a two-step process. When granted by the Board, planning authority indicates that the Board approves in principle the “idea” that the institution can offer that program; i.e., the program is seen as appropriate for the institution, and there are no statewide implications that would preclude the institution from offering the program sometime in the future (if relevant expectations regarding quality, need, and cost are met). In step two of the process, the institution develops and submits a proposal to the Coordinating Board staff after the resources for the program are in place. The program must then be approved by the staff or Board, as appropriate.

This two-step approval process has several purposes: 1) it promotes strategic planning by the institution on a four-year cycle; 2) by first requiring planning authority (as the norm), it prevents an institution from putting time, energy, and resources into a proposed program to which the Board might have a fundamental objection; 3) it streamlines the overall approval process, because after an institution has planning authority for a (non-doctoral) program, the eventual proposal can be approved by the staff if it meets specified criteria (e.g. five-year new costs are under \$2 million); and 4) in granting planning authority, the Board can judge these requests within a statewide perspective.

The system, as described above, has been a useful planning tool for the Board and state. However, there have been problems and limitations with the process, especially for requests for doctoral programs. In recent years, more institutions have been submitting requests for doctoral programs without first having planning authority for them. The Board does allow simultaneous requests for planning authority and program approval, but such requests are meant to be limited to the [few] occasions in which a need and opportunity for a program come up unexpectedly within the four-year cycle[; this would not (or should not) be the case with the vast majority of new doctoral programs].

The staff also believe that the criteria the Board now uses for granting planning authority are not adequate for doctoral programs. The current criteria, which are undifferentiated by degree level (bachelor's, master's, and doctoral), are: 1) vocational need, 2) unnecessary duplication, 3) critical mass for high level of quality, and 4) whether the

program complements and strengthens existing programs. Since doctoral programs are very expensive (to the institution and the state) and are very different from baccalaureate and master's programs, staff believe these criteria are inadequate for granting planning authority for doctoral programs.

Finally, the two-step approval system has some limitations as a planning tool. While it allows the Board to grant or deny approval, it is still, inherently, a *reactive* process. It responds to requests by institutions for program approval; it is almost exclusively institution-driven. Institutional strategic planning is important, even imperative, to drive program development in higher education. But planning on the institution level, or even system level, cannot account for all statewide interests.

The following recommendations address these limitations and problems. Note that these recommendations do not preclude any institution in Texas from *having* doctoral programs; i.e., it is not a "California model" (described in Part 1 of the report). However, it does "raise the bar" in some respects for institutions to demonstrate that the state has a strong need for a particular doctoral program and that the particular institution is best suited to offer that program.

#### **Recommendations and Rationales:**

1. Require institutions to have planning authority for a doctoral program before submitting it to the Coordinating Board. Planning authority requests to the Board for doctoral programs should usually come during an institution's regular four-year review cycle. However, upon approval by the Commissioner, the Board may allow institutions to request planning authority at other times if the need for more prompt action is warranted. ~~[Institutions could, however, only upon approval by the Commissioner, request planning authority from the Board for a doctoral program within the four-year cycle (and prior to regular review).]~~ Institutions should provide a strong rationale for such a request.

##### **Rationale:**

As indicated above, an increasing number of institutions are submitting doctoral program requests without having planning authority for the program. In 2003, over *half* of the doctoral proposals submitted to the Coordinating Board did not have accompanying planning authority for the programs. When institutions request simultaneous consent for planning authority and program approval, it negates the advantages of the two-step planning process. ~~[Doctoral programs require considerable forethought and should be planned a number of years in advance.]~~ However, the staff recognize that institutional long-term planning cannot always predict the need for doctoral growth, particularly in fast-emerging fields. Therefore, the recommendation allows a mechanism for out-of-cycle requests for planning authority. ~~[The planning authority process allows the Board to judge issues such as unnecessary duplication and mission differentiation before the institution has invested large amounts of resources into a program that the Board would not approve.]~~

2. In addition to the four criteria now applied in considering planning authority for degree programs at *any* academic level, change Coordinating Board rules Section 5.24 (a) to include added criteria applied to doctoral program requests. The criteria specific to doctoral requests would be whether:
  - a. there is a demonstrated state and national unmet need (now and in the foreseeable future) for *doctoral* graduates in the field (not just baccalaureate or master's-level graduates); or there is an unmet need for a doctoral program with a unique approach to the field;
  - b. there is evidence that existing doctoral programs in the state cannot accommodate additional students; or that expanding existing programs would not best serve the state;
  - c. the institution has strong baccalaureate- and master's-level programs in the field and/or strong programs in related and supporting areas;
  - d. the program has the marked promise of excellence and the institution is well-suited (sometimes uniquely suited) to offer the program and achieve that targeted excellence (see "d" below for more explanation of "well-suited"); and
  - e. the institution's existing programs (undergraduate and graduate) have demonstrated excellence.

Rationale:

As stated above, staff believe that the state would benefit from greater coordination of its doctoral offerings. Doctoral programs require significantly more resources to deliver and, therefore, merit additional scrutiny. The additional criteria in the recommendations are specific to doctoral programs and are important for the following reasons:

- a. In some disciplines, demand can be high for master's graduates but quite limited for doctoral graduates.
- b. In some circumstances, it would be more efficient and cost-effective to attempt to expand existing doctoral programs in a discipline rather than develop a new one. Expansion could be accomplished in some cases by adding more students (if possible) to existing programs in the same area; in other cases, expansion could take place by adding a specialization to an existing program offering a general program in the discipline. (The staff note, however, that expansion may not always be the most appropriate method to accommodate growth in the discipline.)
- c. For doctoral fields that typically have undergraduate and master's programs, it is necessary for an institution to have strong programs at these levels to support a successful doctoral program. While it is true that an undergraduate program and master's program can benefit from the presence of a doctoral program in the discipline, the bachelor's and master's programs should already be sound.
- d. With very few exceptions (see next section), the Coordinating Board expects new doctoral programs to have the potential to gain national prominence in their respective fields. In seeking planning authority for a particular doctoral program, an institution should be able to show evidence

of why it would be especially well-suited to offer that program. Such evidence could include the institution having: (i) significant existing resources in the discipline, (ii) proximity to necessary resources and needed research opportunities specific to the discipline, (iii) existing significant record of research in the field, and (iv) opportunities for clinical experiences or internships specific to the discipline. Accordingly, the desired doctoral program should be a “fit” for the institution.

- e. The missions of all 35 public universities include providing students a high quality undergraduate education. Even at Texas A&M University and The University of Texas at Austin, the state’s two “research” institutions (as designated by the proposed accountability system), over 75 percent of students are undergraduates. It is critical that the state’s public universities excel at educating this population. Since doctoral programs can divert faculty and other resources away from undergraduate programs, it is reasonable to expect institutions to show evidence of strong undergraduate programs before adding doctoral programs and to offer assurances that new doctoral programs would not negatively affect undergraduate programs. The staff also believe that institutions should show evidence of quality in existing doctoral programs before adding new ones. Institutions should have acceptable graduation rates, numbers of graduates, and time-to-degree figures in most or all of their existing doctoral programs.

The additional criteria identified above for planning authority approval for doctoral programs should help the Board assess the appropriateness of doctoral requests from universities and health-related institutions. And differentiating planning authority criteria for baccalaureate/master’s requests versus doctoral requests is consistent with Coordinating Board rules which identify criteria for evaluating program proposals; i.e., rules for baccalaureate and master’s programs (Section 5.45) are distinguished from rules for doctoral programs (Section 5.46).

3. Change the name “planning authority” to another term that better denotes the meaning of the designation. The staff recommend the term “preliminary authority.”

Rationale:

“Preliminary authority” better conveys the meaning that the Board has “approved in concept” that the institution can offer the program. Institutions should consider “preliminary authority” (which will be used throughout the rest of the report) to be a significant advancement toward being able to offer the degree.

4. Perform and implement the following statewide needs assessment:

#### **Phase 1: Assessment**

- *With institutional involvement*, develop a statewide needs assessment to identify key disciplines in which the state and nation need additional growth in doctoral graduates and disciplines that have low or no call for growth. For each discipline examined, the criteria used in the needs assessment would include:



- a. Demand for graduates (in academia and other fields)
- b. Demand from students
- c. Potential benefit to the state and nation (research dollars and other benefits)
- d. Current enrollments in Texas institutions and research dollars received by Texas institutions
- e. Costs to institutions and state

### **Phase 2: Institutional analysis**

- For each discipline identified as potentially needing growth, determine if the growth can best and most appropriately be met by expanding and enhancing existing doctoral programs or by creating new programs.
- For each discipline in which growth cannot (or should not) be met by expanding existing programs, solicit institutional interest in the development of a doctoral program. For each of these disciplines, develop an institutional analysis to identify possible universities or health-related institutions that would be well-suited for offering the designated program. For each discipline reviewed, the criteria used (when applicable) in the institutional analysis would include:
  - a. Mission compatibility
  - b. Institutional interest in discipline
  - c. Strong baccalaureate and master's programs in discipline
  - d. Significant existing resources in the discipline and proximity to necessary resources
  - e. Significant existing production of research dollars in the discipline
  - f. Strong performance measures for existing undergraduate, master's, and doctoral programs (institution-wide)
  - g. Existing programs in the discipline in the region

### **Phase 3: Institutional response**

- Encourage one (or more) "well-suited" institutions to consider developing a program in the discipline. If appropriate, encourage collaborative or joint programs. In particular, support well-suited institutions in regions with fewer doctoral programs. Allow institutions not identified as good candidates for specific programs to make their case for inclusion.
- Discourage all institutions from submitting requests for "preliminary authority" (planning authority) for doctoral programs identified as "low need."

### **Phase 4: Reassessment**

- Repeat the needs assessment (and other steps in the process) every three to five years.

**Rationale:**

As mentioned in Part 1 of the report, the number of doctoral programs initiated in the state in each of the last two years is greater than in any of the previous eight years. The report also noted several reasons that drive institutional interests in doctoral programs. Regardless of the reasons, an institutional request for a doctoral program (or planning authority for a doctoral program) often comes without knowledge of other institutional doctoral interests and strengths in the discipline (although institutions within a system should be aware of the doctoral interests of sister institutions). A proactive approach as proposed above could help: (a) make it more likely that requests for doctoral programs come in high-need areas; (b) identify the institutions that are best suited for potential particular doctoral programs and encourage those institutions to develop them; (c) discourage doctoral requests from institutions not well-suited for particular programs; (d) foster collaborative or joint degrees when appropriate; (e) reduce inefficiencies; and (f) place continuing emphasis on the importance of demonstrated excellence in the institution's *existing* academic programs.

This process should not and would not preclude institutions and systems from pursuing their own strategic academic planning including doctoral education. (And institutions could still submit requests for "preliminary authority" independent of this process.) However, academic planning on individual campuses should not take place in a vacuum. If different institutions have overlapping goals for doctoral education, then the best system is not to approve programs on the basis of which institution makes the first request. Statewide long-term planning, as described above, would be a very challenging task. However, if successful, it could help foster growth of doctoral programs in needed areas at institutions best suited to deliver these programs.

### **C. Access/Opportunity**

**Key Questions:**

1. In the development of new doctoral programs, what considerations should be given to areas of the state with few doctoral programs? Should every region of the state offer doctoral programs?
2. What are exceptions to the presupposition that doctoral programs should have a national scope?

**Background:**

Doctoral programs are inherently resource-intensive. In all disciplines, they require physical resources (laboratories and libraries) and human resources (faculty and support staff) that go significantly beyond – in quantity and quality – the resources needed to support baccalaureate- and master's-level education. In addition, doctoral programs are

focused or specialized within disciplines to a far greater extent than baccalaureate or master's programs, which are broader and more general.

Because of that specialization, most doctoral programs need to cast a wide net out to potential students to attract those whose interests, needs, and capabilities match the focus and expectations of the program. Consequently, doctoral education is generally expected to have a national scope, with institutions recruiting students on a statewide, national, and international basis, and graduates often seek employment far away from the institution from which they received their doctorate. Part 1, pages 34-35 of this report provided additional commentary on this topic and also discussed why a national focus for doctoral education is healthy for higher education as a whole. However, as also indicated in that discussion, there should be limited exceptions to these general expectations. For example, in disciplines such as educational administration, where most graduates take positions in the public schools, populous areas can sometimes provide both a steady regional pool of qualified students seeking access to such programs and a steady regional demand for graduates.

With this discussion as a framework, one important question remains: should every region of the state, as a matter of policy, have doctoral programs? As shown on page 19 of Part 1 of this report, three regions of the state have no doctoral programs and one other region has only four programs. If a region of the state has relatively few people, and its institutions produce relatively few baccalaureate graduates, then the establishment of *regionally based* doctoral programs in that area is difficult to justify ~~[especially when budgets are tight]~~. It would be very unlikely that institutions in less populated areas of the state could attract the critical mass of students to financially sustain a regionally based doctoral program.

~~[However, given the size and diversity of the state, and the history of higher education development in Texas,]~~ The staff is *not* recommending that the Board ~~[should not]~~ explicitly prohibit such institutions ~~[any institution]~~ from developing doctoral programs. We are recommending that proposed programs ~~[But for reasons cited above, with few exceptions, staff believe that doctoral programs should]~~ be nationally focused, meet the proposed "preliminary authority" criteria set forth on pages five to seven of this report, and present a reasonable likelihood of achieving national prominence. Admittedly, it could ~~[will]~~ be difficult for small institutions in less-populated areas of the state to meet certain criteria, such as "whether the program has the marked promise of excellence and the institution is well-suited (sometimes uniquely suited) to offer the program and achieve . . . targeted excellence." Institutions would have to show they have 1) significant resources in the discipline, 2) proximity to necessary resources and needed research opportunities specific to the discipline, 3) a significant record of research in the field, and 4) opportunities for clinical experiences or internships specific to the discipline (if applicable). ~~[Many institutions could also have difficulty meeting the criterion that "existing programs (undergraduate and graduate) have demonstrated excellence."]~~ Small or regional institutions that *do* meet ~~[those and other]~~ "preliminary authority" criteria are likely to do so in "targeted areas of excellence," rather than across broad disciplines.

There are, however, different implications for state policy for institutions in highly populated areas of the state that produce a large number of baccalaureate graduates but offer few doctoral programs. Staff believe that those areas could support regionally

based programs in disciplines of broad appeal (as indicated above). It is also reasonable to expect communities with large populations to have institutions that could offer doctoral programs with a national scope. Even under these circumstances, institutions should be expected to meet the proposed “preliminary authority” criteria, including the “well-suited” criterion. With a larger population base and perhaps more resources, it is more likely these institutions could meet the criteria (in some disciplines) than could institutions in small communities. ~~[However, the proposed criteria are (appropriately) arduous for any institution, and doctoral growth for institutions in large communities would likely also come in “targeted areas of excellence.”]~~

Regardless of how much doctoral growth there is in the state, Texas is unlikely to be able to support doctoral programs in multiple disciplines in every area of the state.

Demographics and economies of scale do matter, and ensuring doctoral programs in every region of the state is a questionable educational policy. ~~[For the foreseeable future,]~~ Access to some ~~[most or all]~~ doctoral programs for some individuals ~~[living in less-populated regions]~~ will either require leaving the region, participating in distance education programs (viable in some fields of study), or participating in collaborative partnerships between regional institutions and institutions with greater resources that can be appropriately extended off campus.

### **Recommendations and Rationale:**

1. Where appropriate, support access to doctoral study through distance education efforts and cooperative programs in selected disciplines to address unmet regional needs.

Rationale:

~~[The state will not likely be able to support additional doctoral programs in multiple disciplines in every area of the state in the foreseeable future.]~~ Regional needs for doctoral graduates in some disciplines clearly must be met through alternative means, as they have always been. Fortunately, additional means, other than leaving the area, are now available and appropriate in some disciplines.

2. Support additional targeted doctoral programs in areas of the state with high populations, a large number of baccalaureate graduates, and demonstrated, unmet regional needs. This recommendation presumes that the proposed “preliminary authority” criteria would be met.

Rationale:

Populous areas could support selected regionally based doctoral programs. Note, however, that any doctoral program would be enhanced with a wider geographic focus and should strive for that.

3. Support doctoral program requests that emerge from the needs assessment process outlined earlier in this report. In particular, support requests from well-suited

institutions in regions with fewer doctoral programs, especially if the regions are highly populated.

Rationale:

A formal needs assessment could indicate the call for new nationally focused doctoral programs in particular disciplines and could identify the institutions that offer the best promise of success at a very high level. Supporting institutions in regions with fewer doctoral programs would improve geographic access to doctoral programs in the state.

4. Encourage and expect existing prominent doctoral programs in the state to aggressively recruit students from the state's regional institutions, particularly those in areas with few doctoral programs.

Rationale:

This strategy could help increase opportunity for these students.

## **D. Diversity:**

### **Key Questions:**

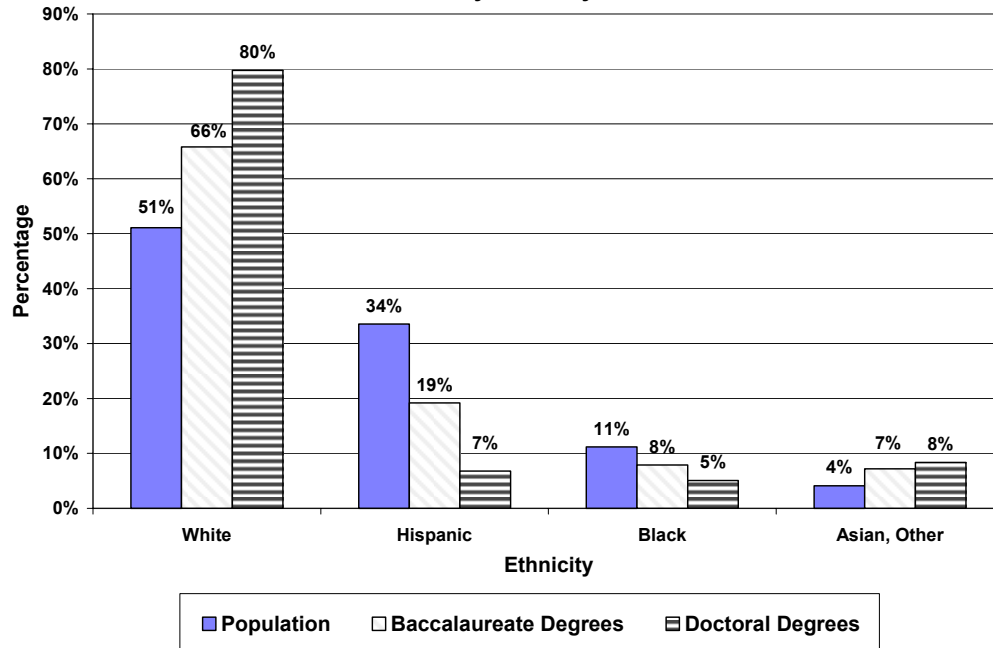
1. How can institutions increase student diversity in their doctoral programs?
2. How can institutions maintain an appropriate international student presence in their doctoral programs?

### **Background:**

#### **Students from Underrepresented Groups**

As indicated in Part 1 of this study (page 30-31), the percentage of Black and Hispanic doctoral students in most Texas public institutions does not reflect their representation in the overall population of the state or their representation in undergraduate education. Of particular concern is the under-representation of these groups in the disciplines of math and science. Higher education institutions need to develop and implement strategies to increase participation and success of students from under-represented groups. The following chart from Part 1 shows the relative imbalance of doctoral degrees awarded at Texas public institutions by ethnicity.

**Comparison of Texas Population and Baccalaureate and Doctoral Degrees Awarded to Non-International Students by Texas Public Institutions by Ethnicity in 2001**



Sources: IPEDS on NSF's WebCASPAP, Tx Higher Education Coordinating Board, U.S. Census Bureau

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Note that the public institutions located in South Texas already have a strong commitment to serving the Hispanic population in the region. For example, 43 percent (15 students) of the doctoral graduates for the period 1999-2003 at The University of Texas-Pan American were Hispanic. Other South Texas and border institutions graduating a significant number of doctoral graduates during the last five years are listed in the table below.

Institution	Percent of Doctoral Degrees Awarded to Hispanic Students	Number of Doctoral Degrees Awarded to Hispanic Students
The University of Texas-Pan American	43%	15
Texas A&M University-Kingsville	41%	25
Texas A&M University-Corpus Christi	38%	12
The University of Texas at San Antonio	35%	7
The University of Texas at El Paso	25%	30
The University of Texas Health Science Center at San Antonio*	7%	11

\*Although outside the scope of this study, it should be noted that for the period 1999-2003 UTHSCSA awarded 14% (142 students) of its MD degrees to Hispanic students.

Texas' two public historically Black universities primarily serve African-American students, although the student diversity of each is increasing. Eighty-two percent (80 students) of the doctoral graduates during the last five years at Texas Southern University were Black. Prairie View A&M University's first doctoral program began in 2000 and has had no graduates to date. In fall 2003, there were 18 Black doctoral students enrolled at the institution, two Hispanic doctoral students, and three international doctoral students. Although the contribution of these institutions is very important, minority-serving institutions cannot and should not bear the full responsibility of recruiting and graduating significant numbers of Black and Hispanic doctoral students.

### **International Students**

Part 1 of this report also indicated the benefits of having international students in U.S. doctoral programs. From 1991 to 2001, international students represented about one-fourth of the doctoral graduates in the U.S. and Texas. However, recent findings by the Council of Graduate Schools indicate that international student applications and admissions to U.S. graduate schools showed a significant decline for fall 2004.

The results of the most recent survey (conducted in the summer of 2004) indicate a 28 percent decline in international graduate student applications and an 18 percent decline in admissions to U.S. graduate programs. The largest drop (36 percent) was in engineering. Programs in the sciences, which typically draw large numbers of international students, reported an overall decrease of 20 percent in applications. If these declines continue, they will have a considerable impact on the number of graduates over the next five to 10 years. The factors that appear to be contributing to the declines include changes in visa processes after the events of September 11, 2001; increased competition for students with universities in other countries, such as Canada; and the development of high-quality doctoral programs in the sciences and engineering abroad. While recognizing that ensuring national security is critical, the Association of International Educators recently adopted policy recommendations outlined in *Promoting Secure Borders and Open Doors* to address the visa problems encountered by international researchers, educators, and students wishing to enter or re-enter the U.S. Although Texas would not expect (or desire) to see doctoral programs dominated by international students, the state, nation, and other countries benefit from an international presence in doctoral education. Texas should attempt to preserve such a presence.

### **Recommendations and Rationale:**

1. Encourage institutions to implement practices to increase diversity in their doctoral programs. Efforts at diversifying doctoral programs that have proved successful at U.S. institutions are listed below. (See Appendix A)
  - Develop mentorship programs:
    - Between faculty members and undergraduate students to allow them to work on research projects that permit students to explore their interests, discover their intellectual capabilities, and set academic and career goals. Such programs could help to demystify the academic career path, especially for Black and Hispanic students, some of whom have difficulty

imagining themselves in such careers. (The University of Missouri-Columbia)

- Between faculty members and master's students to allow students to observe faculty engaged in a variety of professional activities including teaching, research or creative projects, and service. These programs would often include close academic counseling based on the student's interests, skills, and goals. (Prairie View A&M University)
- Between experienced graduate students and new graduate students or undergraduates. These programs include regular information-sharing meetings, visits to classes that the experienced graduate student teaches, partnership on research or creative projects, and other activities. (The University of Mississippi)
- Develop an on-campus visitation program aimed at recruiting Black and Hispanic graduate students. Include visits with faculty and administrators, informational sessions with current graduate students, class observations, and social activities. (SUNY at Stony Brook)
- Develop internships that provide practical experience in non-academic work environments for Black and Hispanic students not pursuing a career in academia. (The University of Maryland-Baltimore County)
- Establish contact with directors of programs that specifically serve underrepresented Black and Hispanic students to identify strong prospective students in their current undergraduate institutions. (Many institutions do this.)
- Recruit students from historically Black- and Hispanic-serving institutions that send a high number of their baccalaureate graduates to graduate school. (Many institutions do this.)
- Increase awareness of the various national programs that are available to support Black and Hispanic graduate students financially and academically. (Many institutions provide this information online. See Appendix B for a description of some of these programs.)
- In creating budgets, allocate resources specifically for the development of programs and initiatives to increase diversity in graduate education.

(Also, see Appendix C for additional efforts by Texas institutions to increase diversity in doctoral programs.)

#### Rationale:

Institutions that are currently employing these strategies across the nation and within the state report varying degrees of success. Several of these institutions, having received awards for their comprehensive efforts to create an inclusive environment in graduate programs, indicate considerable increases in enrollments of Black and



Hispanic students and in completion rates for these students. Although some of these initiatives are still in the early stages of implementation, Texas institutions should consider using them or finding similar ways to address the issue of diversity.

2. The Coordinating Board should direct institutions with “low percentages of Black and Hispanic students” in their doctoral programs to formulate a plan to increase participation by these groups and to monitor progress.

Rationale:

Given the low enrollment of Black and Hispanic students at the doctoral level, institutions should be accountable for their efforts to attract these groups to their doctoral programs.

3. Continue to support the U.S. Department of Education’s Office for Civil Right’s *Priority Plan to Strengthen Education at Prairie View A&M University and Texas Southern University* to enhance doctoral education at these institutions. See Appendix D for a brief description of the Priority Plans and for current efforts at these institutions to increase minority participation in doctoral programs.

Rationale:

The current priority plan for these institutions includes the creation of a number of new master’s and doctoral programs in high-demand fields, such as pharmaceutical sciences, computer science, management information systems, electrical engineering, and educational leadership. Several of these programs have recently been implemented. (See Appendix D for a list of recently approved doctoral programs at these institutions.) The Coordinating Board supports these efforts to provide increased educational opportunities for the underrepresented students served by these institutions.

4. Examine possible ways to stabilize the presence of international students in doctoral programs.

Rationale:

The Council of Graduate Schools reports that, in response to the significant decline in international applications and admissions, many of the institutions surveyed are developing ways to improve the admissions process for international students. For example, a list of policy changes recently implemented by certain schools include: altering the admissions dates to allow potential students more time to deal with visa processes; earlier notification of admission; providing counseling on the visa process by developing print brochures, electronic resources, and workshops; creating a call center to provide service to students who have questions about the application/admission process and the status of their application; and using technology to a much greater extent (e.g., developing or improving electronic applications, virtual orientations, and e-mail notification of admissions status). Texas institutions should examine their own procedures for international graduate student application and admissions to determine if these approaches would be useful.

## **E. Attrition and Time-to-Degree**

### **Key Questions:**

1. How can institutions decrease attrition (i.e., increase graduation rates) and decrease time-to-degree for doctoral programs?
2. How do attrition and time-to-degree vary by discipline and by institution in Texas?

### **Background:**

As stated in Part 1 of this report, studies indicate that 40 to 50 percent of students who begin their doctoral programs do not persist to graduation. In addition, the National Science Foundation reports that the national median “registered time-to-degree” (after the baccalaureate degree) rose from 5.8 years in 1972 to 7.6 years in 2002.

In response to the increasing national (and international) concern about the high level of attrition and increased time-to-degree among doctoral students, there is a growing body of research literature<sup>1</sup> about the factors that influence whether or not students complete their doctoral degree programs. This research has revealed that long time-to-degree correlates with a low completion rate. As one might expect, this research also indicates that there is no single factor that stands out as the “key” way to improve student persistence and success. Instead, findings indicate that multiple factors interact in a complex way.

The weight of the evidence suggests that neither traditional academic indicators nor demographic variables are consistently reliable predictors of persistence to completion of the doctoral degree. Rather, research indicates that other factors need to be considered when developing strategies for positively influencing student persistence and reducing their time-to-degree. These factors are summarized as follows:

1. Research consistently reveals that there are significant differences in completion rates and time-to-degree across major fields of study. Students in the humanities and social sciences have the lowest completion rates; biological and physical science doctoral students have the highest. It appears that writing dissertations pose particular challenges for students in the humanities and social sciences, primarily because these students usually face a solitary research and writing experience and because they are more reliant upon the advising relationship for the dissertation process and doctoral completion. Other explanations for these differences include the generally higher levels of financial support for biological and physical science

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<sup>1</sup> Particularly notable is information obtained from: (a) Carolyn Richert Bair’s and Jennifer Grant Haworth’s 1998 “meta-synthesis” of 118 research studies on doctoral student attrition and persistence completed between 1970 and 1998, (b) the 2001 Higher Education Series Report “Factors Associated with Completion of Research Higher Degrees,” and (c) Ronald Ehrenberg’s and Panagiotis Mavros’ 1995 study of the influence of financial support patterns on doctoral completion rates and times-to-degree.

students, higher frequency of research (versus teaching) assistantships for science students, and the greater day-to-day involvement between the science advisor and advisee in the laboratory environment.

2. The financial support offered to doctoral students affects attrition and persistence. Students who hold fellowships, research assistantships, teaching assistantships, or graduate assistantships are more likely to complete their degrees, and in less time, than students who rely on other types of funding.

Of the studies concerning the influence of financial support patterns on completion rates and times-to-degree, one is particularly noteworthy. Researchers found that graduate students who entered PhD programs in economics, English, mathematics, and physics at Cornell University between 1962-1986 had completion rates and times-to-completion averages that were sensitive to the *types* of financial support the students received. Students who received fellowships or research assistantships had higher completion rates and shorter times-to-degree than students who received teaching assistantships or tuition waivers, or who were totally self-supporting.

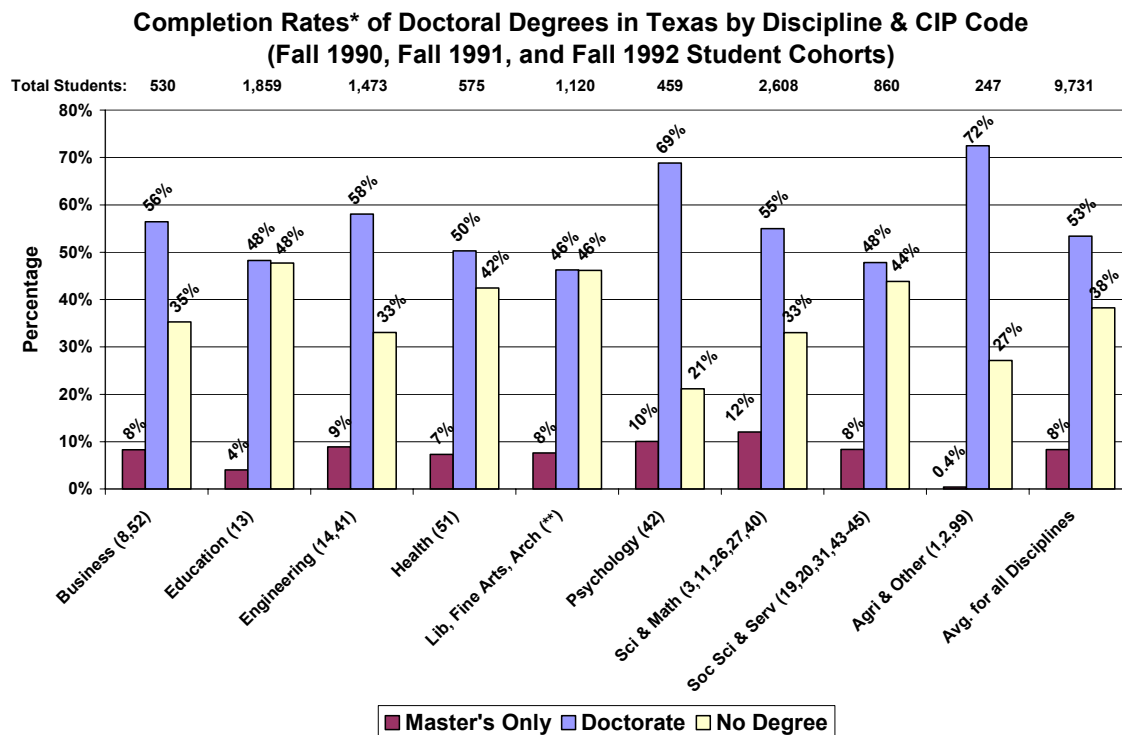
3. Difficulties with various aspects of the dissertation are related to attrition. Research indicates the following factors aid in dissertation completion: (a) good advisor who is able to provide constructive feedback and is supportive, interested, and competent; (b) good topic choice that is manageable and interesting; (c) early selection of topic; (d) internal personal strength characterized by independence, high motivation, and ability to endure frustration; (e) self-imposed deadlines and goals; (f) limiting employment; (g) delaying internship until completion of the dissertation; and (h) externally-imposed incentives such as future employment. Research also indicates that the following factors are particularly helpful to students completing dissertations in the humanities and social sciences: (a) working in a collaborative environment, (b) frequent interaction with advisors, (c) having information about academic publishing, and (d) having a suitable financial aid package.
4. The degree and quality of the relationship between doctoral student and advisor has a strong, positive relationship to successful completion of the doctorate. In studies of attrition, students' departure has been found to be due in part to: (a) inadequate or inaccurate advising, (b) lack of interest or attention on the part of the advisor, (c) unavailability of the advisor/faculty to students, or (d) a negative or conflictual relationship between the student and advisor/faculty. Some researchers have identified the student/advisor relationship as the most important variable in doctoral student attrition and persistence.
5. Student involvement in various programmatic, departmental, institutional, and professional activities and opportunities contributes favorably to doctoral student retention and completion. Involvement includes attendance and participation in graduate association meetings, academic activities, social activities, informal and formal meetings, and professional activities.
6. Students' satisfaction with their academic programs contributes favorably to doctoral degree completion. Research reveals that the following factors contribute to students' satisfaction: (a) perceived fulfillment of students' expectations, (b) quality of

the program, (c) fairness of requirements, (d) consistency in the evaluation of students, (e) faculty communications with students, (f) faculty concern for students as professionals, and (g) faculty guidance.

7. Peer interaction is related to persistence. Doctoral degree completers are more likely to be involved with their academic peers than are non-completers. However, research reveals that while student-to-student relationships are important for student persistence, they do not play as prominent a role as do student-to-faculty relationships.
8. Doctoral programs that have smaller entering cohorts generally have lower time-to-degree and higher completion rates than programs with larger entering cohorts.
9. Low student morale due to poor employment prospects in the academic profession negatively impacts completion rates.

### Attrition and Time-to-Degree in Texas:

The following chart illustrates the ten-year completion rates of students in Texas doctoral programs by discipline for three student cohorts.



\* Each cohort tracked for ten years.

\*\* "Liberal Arts, Fine Arts, and Architecture" includes CIP Codes 4, 5, 9, 16, 23, 24, 25, 30, 38, and 50.

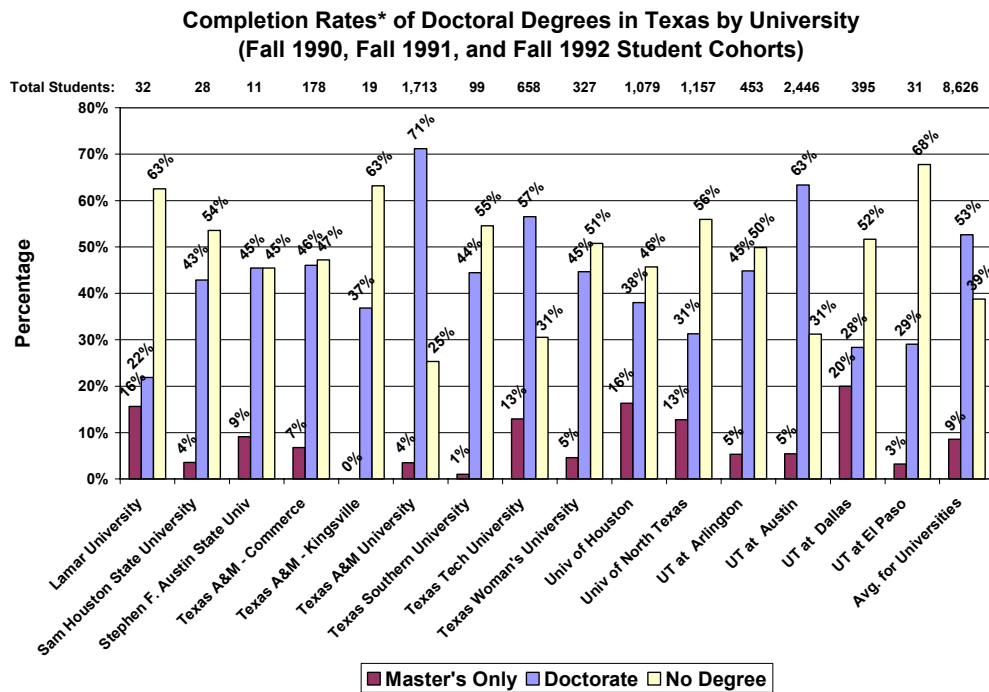
Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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Note: See Appendix E for a list of Classification of Instructional Program (CIP) Codes.

Note: See Appendix F for a description of the data analysis methodology used for the data depicted in the charts in this section.

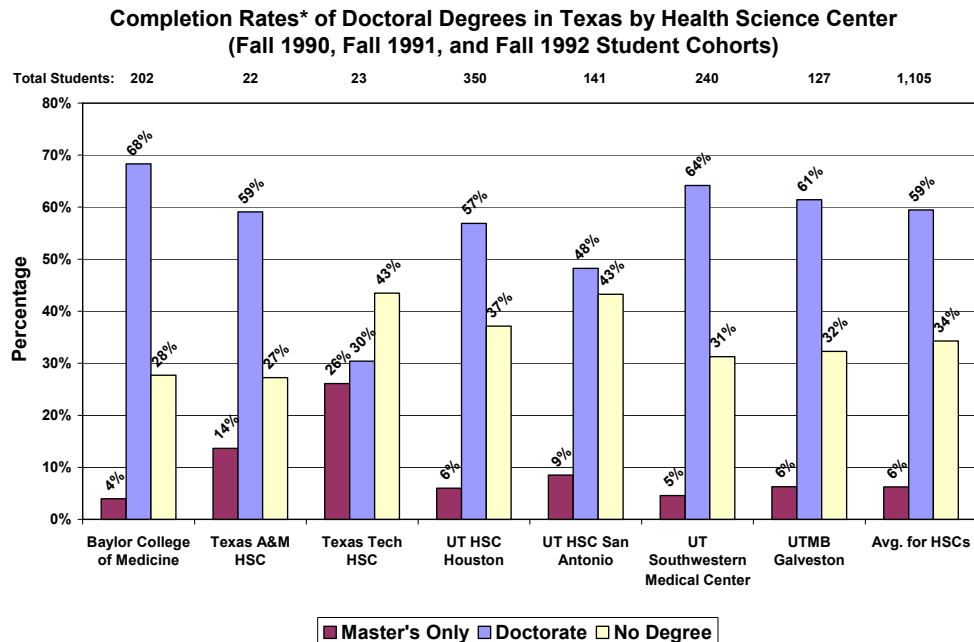
At the institutional level, significant differences in doctoral completion rates are evident.



\* Each cohort tracked for ten years.

Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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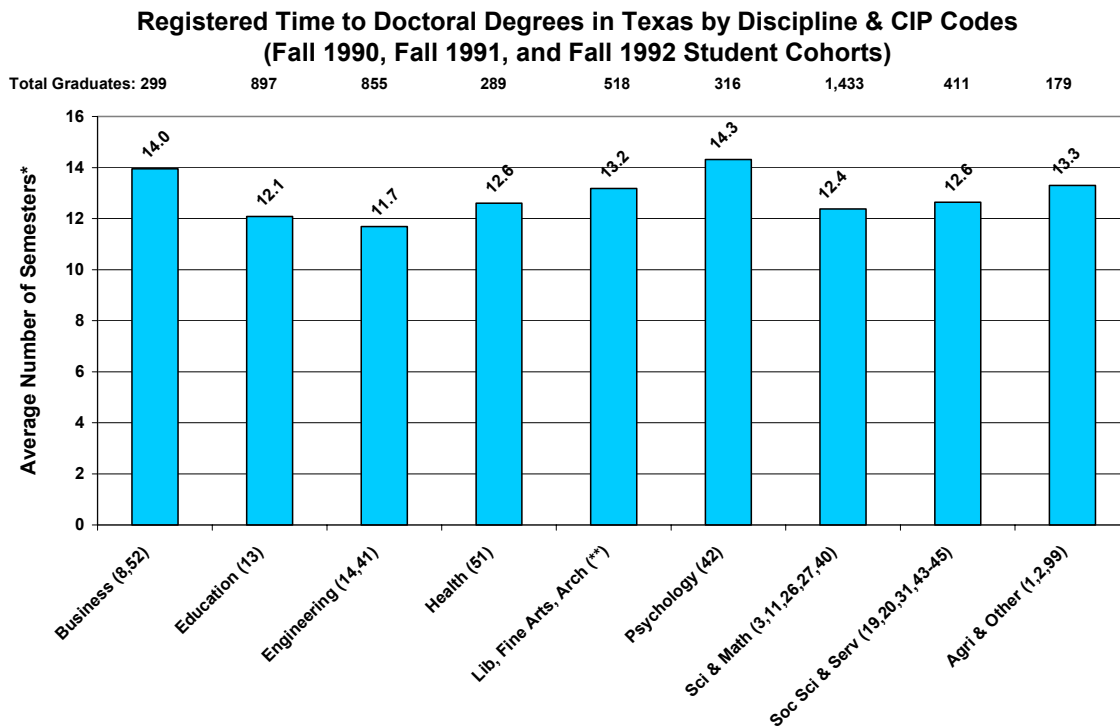
\* Each cohort tracked for ten years.

Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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*Note: As indicated in the text, completion rates vary significantly by academic discipline. See Appendices G - H for further analyses.*

Registered time-to-degree (RTD) takes into consideration only the time for which the student was registered as a doctoral (not master's) student, excluding any semesters taken off during study. The following chart illustrates that the RTD for students in Texas doctoral programs differs by discipline. Doctoral students in Engineering had the shortest RTD; doctoral students in Psychology had the longest.



\* Average number of semesters are weighted averages, based on doctoral graduates who began in fall 1990, fall 1991, or fall 1992.

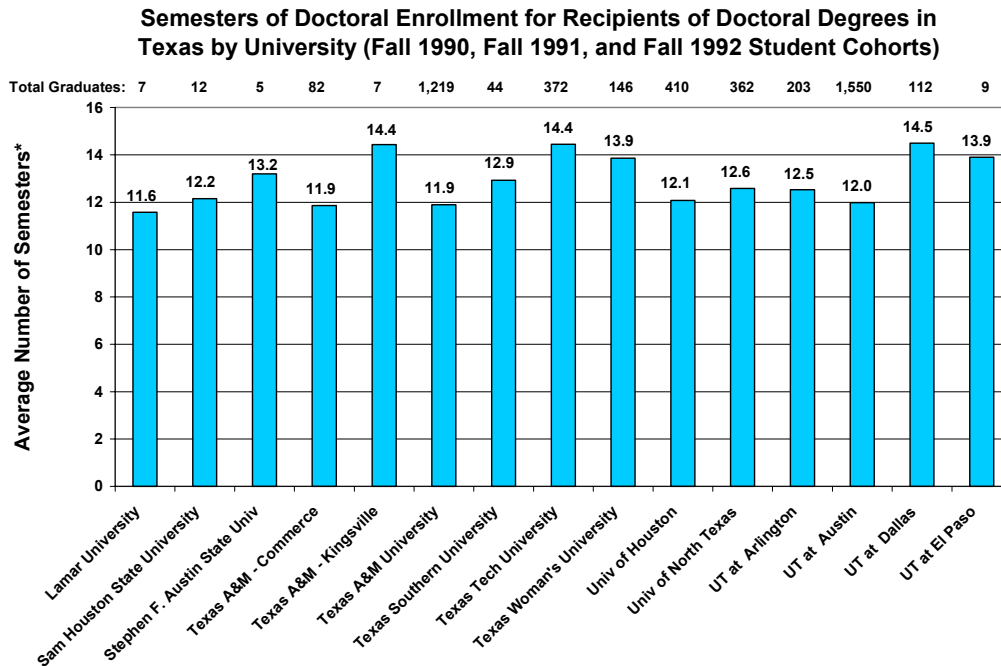
\*\* "Liberal Arts, Fine Arts, and Architecture" includes CIP Codes 4, 5, 9, 16, 23, 24, 25, 30, 38, and 50.

Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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*Note: Registered time-to-degree includes two full semesters and one summer session, so dividing the number of semesters by three will yield registered time-to-degree in years.*

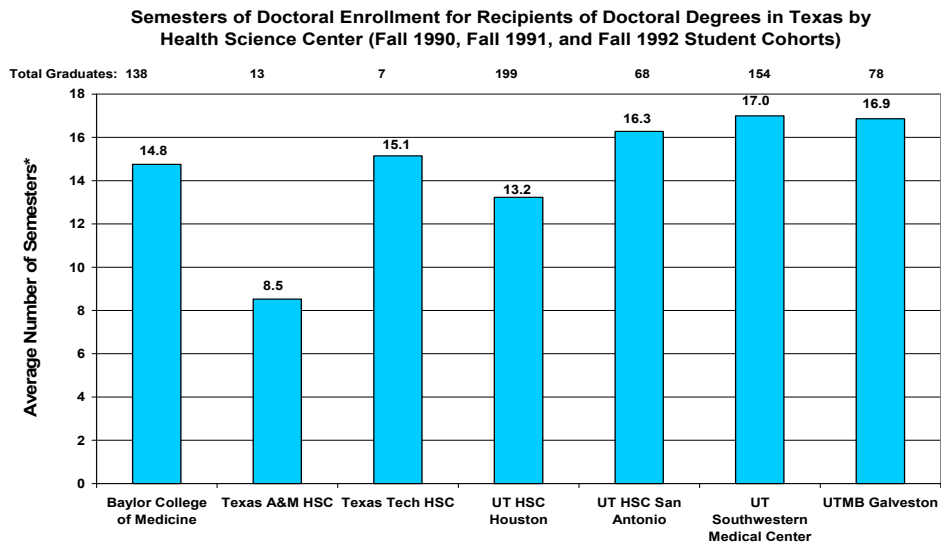
At the institutional level, notable differences in RTD are apparent.



\* Average number of semesters are weighted averages, based on doctoral graduates who began in fall 1990, fall 1991, or fall 1992.

Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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\* Average number of semesters are weighted averages, based on doctoral graduates who began in fall 1990, fall 1991, or fall 1992.

Sources: Texas Higher Education Coordinating Board; institutions' CBM 001 and CBM 009 Reports.

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*Note: Time-to-degree varies significantly by academic discipline. See Appendices I - J for further analyses.*

## **Recommendations and Rationale**

Based on staff analysis of factors which have been shown to positively influence student persistence and reduce their time-to-degree, encourage institutions to implement some of the following strategies (listed in order of apparent effectiveness).

1. Provide competitive student financial support for doctoral students in the form of fellowships, research assistantships, and teaching assistantships. Departments should be encouraged not to allocate all their funds for fellowships to attract new students, but to reserve a portion for students at later stages of the degree program. If possible, it is advisable to guarantee four years of financial support for doctoral students (assuming appropriate academic progress). Traditionally available sources of support include:
  - Research assistantships provided by federal and industrial contracts and grants
  - Teaching assistantships funded through earned state formula funding
  - Fellowships or grants funded by increased fee revenue from enrollment growth
  - University partnerships with federal and state governments, industry, foundations, and private donors
2. Provide adequate advising and mentoring for doctoral students. Department heads should not assume that faculty members are capable and attentive mentors.
  - Provide written guidelines for mentors and adequate preparation for mentoring by graduate faculty, based on research about effective mentoring practices.
  - Provide students the opportunity to work with multiple mentors.
  - Hold faculty members accountable for better advising by explicitly including advising as a faculty responsibility and by evaluating professors on their advising along with their research and teaching.
  - Provide organized, institutionalized opportunities for reflection and feedback among graduate students and faculty mentors about important developmental issues, career goals, and other issues.
3. Provide explicit expectations for doctoral students at the departmental level.
  - Make transparent to graduate students the selection processes; the expected progress to the degree; methods of assessment/evaluation; and comprehensive data on placement, time-to-degree, and program completion rates.
  - Foster and support graduate student access to information as well as make explicit all expectations and norms.



- Conduct focus groups and exit interviews to determine match with expectations, especially with any non-completers.
  - Track the progress of doctoral students, candidates, and graduates to assess satisfaction with their experience and better understand their professional career paths.
4. Implement specific activities at the institutional, departmental, and individual levels that are designed to increase completion rates. Within the University of California System, a comprehensive study and subsequent efforts to reduce time-to-degree and increase doctoral student graduation rates indicate that the following specific activities have yielded positive results:
- Orientation programs
  - Peer-support groups
  - Grant proposal writing workshops
  - Topical interdisciplinary dissertation workshops
  - Dissertation writing workshops
  - Dissertations-in-progress abstract database with author's contact information (database of dissertations in progress, accessible from a university library Web page, and searchable by doctoral students)
  - Academic publishing workshop and academic publishing guide
5. Balance the deep learning of the disciplinary doctorate with the variety of interdisciplinary challenges.
- Provide more opportunities for students to work with one another across disciplinary lines through dissertation retreats, interdisciplinary retreat programs, and other activities.
  - Encourage graduate students to work with more than one mentor in different disciplines.
  - Develop inter-disciplinary, multi-disciplinary, cross-disciplinary programs.

**Rationale:**

Although clear cause and effect linkages are difficult to establish, these recommendations are based on the extensive research on factors influencing attrition, persistence, and time-to-degree which have been reported across multiple institutions and disciplines and which have been shown to positively influence student persistence and reduce their time-to-degree. Particularly notable sources

are the following: (a) recommendations from national studies on doctoral education by Jody Nyquist and Donald H. Wulff, 2000; (b) recommendations by The Commission on the Growth and Support of Graduate Education, The University of California, September 2001; (c) recommendations of The University of California Council of Graduate Deans, 2003; and (d) two academic articles by Maresi Nerad and Debra Sands Miller, 1996 and 1997 regarding The University of California at Berkeley's efforts to increase doctoral student graduation rates and decrease their time-to-degree (see Appendix K).

## **F. Research Funding**

### **Key Question:**

1. Do doctoral programs implemented in the last 10 years align with federal research funding availability?

### **Background:**

As indicated in Part 1 of the study (pages 44-45), federal research funding for institutions represents outside revenue that is used for several aspects of institutional operations and doctoral programs (e.g., salaries, equipment, scholarships) and constitutes a forward-looking investment that seeks to create new knowledge and innovative discoveries. Because of the close association between research funding and doctoral programs, the Coordinating Board staff examined whether new doctoral programs approved in the last 10 years (1994-2003) were associated with fields in which significant federal research dollars were available. Over this 10 year period, there were 106 research-oriented doctorates created in Texas public institutions (85 in universities, 21 in health-related institutions). These new programs are grouped by general discipline in the following table:

<b>Discipline Area</b>	<b>Texas Public Doctoral Programs Started 1994-2003</b>
Engineering	18
Clinical Science	16
Education	14
Bio/Med Science	10
Social Science	7
Business	7
Environmental Science	5
Literature	5
Psychology	4
Arts	4

Disciplines in which fewer than four programs were started are not shown.

Over the last 10 years, a moderately strong relationship exists between programs started (see above) and available federal research funding. Federal research funding in the U.S. and in Texas has remained quite stable across discipline areas over the past ten years. Although results would vary by year, an analysis based on 2002 federal funding is generally typical and is shown in the following table.

<b>Discipline/ CIP Code</b>	<b>2002 Federal Research Funds (Millions)</b>	<b>2002 Texas Research Funds at Texas Public Institutions (Millions)</b>	<b>Texas' Percentage of Available Federal Funds</b>
Medical Science* (51)	\$7,230.5	\$401.5	5.6
Biological Science* (26)	4,406.3	260.6	5.9
Engineering (14)	3,217.3	155.5	4.8
Physical Science (40)	2,124.1	79.9	3.8
Environmental Science (03)	1,293.6	91.7	7.1
Computer Science (11)	769.8	31.4	4.1
Agricultural Science (01)	685.7	25.4	3.7
Education (13)	625.2	24.3	3.9
Social Science (45)	616.2	13.4	2.2
Psychology (42)	474.4	15.3	3.3
Mathematical Science (27)	266.8	26.9	10.1
Others	Not available	16.4	Not available
<b>Total</b>		<b>\$1,142.3</b>	<b>Not available</b>

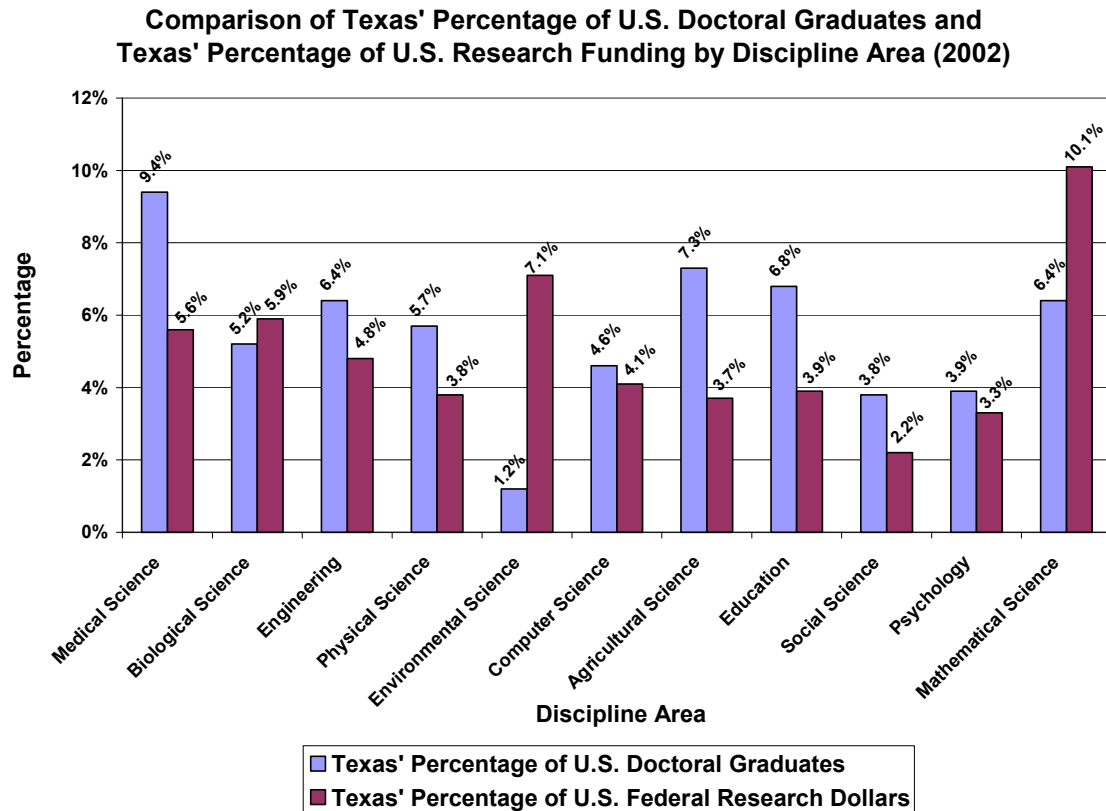
\*Research funding also associated with professional degrees (e.g., MD, DO, DVM, DDS, RN)

Statistically, correlations of .70 (between frequency and U.S. funding) and .64 (between frequency and Texas funding) were obtained. The table also shows (for each discipline area) the percentage of research funds obtained by Texas public institutions out of the total federal funds awarded for the area. These percentages are useful when compared against the percentage of doctoral graduates at Texas public institutions out of the total U.S. doctoral graduates for each discipline as seen below:

<b>Discipline/ CIP Code</b>	<b>2002 U.S. Doctorates</b>	<b>2002 Public Texas Doctorates</b>	<b>Texas Percentage of National Production</b>
Health (51)	1,659	156	9.4
Biological Science (26)	5,680	294	5.2
Engineering (14)	5,073	325	6.4
Physical Science (40)	3,207	182	5.7
Environmental Science (03)	780	9	1.2
Computer Science (11)	811	37	4.6
Agricultural Science (01)	891	65	7.3
Education (13)	6,488	442	6.8
Social Science (45)	4,000	152	3.8
Psychology (42)	3,199	125	3.9
Mathematical Science (27)	917	59	6.4
Humanities/Arts*	5,008	225	4.5
Professional/Other	2,242	208	9.3
<b>Total</b>	<b>39,955</b>	<b>2,279</b>	<b>5.7</b>

\*Includes CIP codes: 05 (area, ethnic, cultural, and gender studies); 16 (foreign languages, literatures, and linguistics); 23 (English language and literature/letters); 24 (liberal arts and sciences, general studies and humanities); and 50 (visual and performing arts).

A partial proxy for estimating the effectiveness of Texas' doctoral programs in securing federal research funding can be reached by combining these two sets of percentages (Texas research funding/federal research funding and Texas doctoral graduates/U.S. doctoral graduates) as observed in the following bar graph.



Sources: 1) National Science Foundation, 2) National Center for Educ. Statistics, 3) Tx. Higher Educ. Coordinating

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For example, a discipline for which Texas is producing a high percentage of the nation's graduates but receiving a significantly smaller percentage of federal research funds could suggest there is little need (at least by this measure) for more doctoral programs in the discipline in the state. Rather than add to the already significant number of doctoral students in the discipline, existing programs need to be more effective at securing more federal funding.

Conversely, if Texas shows a very small percentage of U.S. graduates in a discipline *and* a small percentage of research funds garnered by the state's institutions, then the discipline could present opportunities for doctoral program growth in the state and additional federal funding.

### **Recommendation and Rationale:**

1. While recognizing that some important and worthy disciplines are afforded minimal opportunities for federal funding, to address the research goal of *Closing the Gaps*, the state should especially support doctoral programs that have potential for garnering significant federal research monies or otherwise bring benefits to the state.

**Rationale:**

The data presented above can be useful in targeting potential growth in doctoral programs that could bring more federal research dollars to the state. Of course, this measure would be just one of many criteria in considering the need for new programs. In addition, while there is a strong relationship between doctoral programs and the ability to attract federal research funds, there are clearly a number of non-doctoral programs that obtain research monies. Staff also acknowledges that the number of doctoral graduates in a program is only a rough proxy for “expected research funding.” It is the number of faculty that is a more direct correlate of expected funding, but figures for faculty are not available on a national basis. And there are many other factors affecting funding as well. However, even with the acknowledged limitations, this data can be a useful planning tool for institutions and the state.

**Conclusion:**

Doctoral education provides critical needs for Texas and the nation. It is also expensive and competes with many other higher education needs in the state. Therefore, the Board and higher education institutions must ensure that the state promotes the growth of doctoral programs in the best and most cost-efficient means possible.

The two parts of this report have raised several critical issues and questions concerning doctoral education. The staff believe the recommendations in the second part of the report are important and significant means to address these issues and to enhance the effectiveness of doctoral education in the state.

Before implementing these recommendations, the staff will appoint a standing committee on graduate education that has broad institutional representation. The committee will advise and assist the staff in: 1) developing procedures to implement the recommendations in the report, 2) evaluating the success of implementation, and 3) making suggestions for future directions the Board and institutions should take to enhance graduate and, especially, doctoral education in Texas.

The committee will include representation from public universities, public health-related institutions, and independent institutions. In addition, diversity will be ensured on the committee, with balanced representation from institutions in different regions of the state, from system and non-system schools, doctoral and non-doctoral granting institutions, large and small institutions, and minority-serving institutions.